THE EFFECT OF LAMENESS ON BODY CONDITION, MILK PRODUCTION AND SOMATIC CELL COUNT IN A HOLSTEIN-FRIESIAN FARM

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Abstract: *The aim of the present study was to determine the relationship between lameness and BCS and between lameness and SCC during the lactation. Detailed records were obtained from a south-east Hungarian dairy herd over two years' period (10 times, 4491 data from 862 cows). The cows were classified as lame and not lame. There were four groups by BCS (BCS ≤2; BCS = 2,5-3; BCS >3,5; BCS ≥ 4. The SCC counts were transformed by a logarithmic scale. The ANOVA method was used to investigate the relationship between lameness and BCS and SCC. During the lactation the decreased milk production was associated with an increased BCS but this tendency was better for non-lame cows (r_{nl}=-0.40, r_l=-0.35). In the first 100 days of lactation the milk production of lame cows was higher than that of the not lame cows. Later the not lame cows had higher milk production (r_{nl}=-0.579, r_l=-0.646). The SCC increased during the lactation but the count was higher in the milk of the lame cows.*

Key words*: lameness, cow, SCC, BCS, milk production*

INTRODUCTION

Considerable genetic progress of dairy cow breeding is clearly justified on the basis of production data in recent decades. However, the increasing milk production might cause metabolic disorders, udder problems, lameness and reproductive disorders as well. [4, 6]. Overcoming of lameness is a major task in dairy cows, which is also both an economic and an animal welfare issue [2, 10]. It is also a significant cause of reducing reproductive efficiency and milk production and increasing culling rates [17]. Due to lameless-furthermore, due to pain and reduced mobility- the animal's feed intake is reduced, deterioration in the body condition and state of health, and production will be reduced [13]. Other significant problems are, the pregnancy rate (PR, %) decreases, and the number of ovarian cysts increases, infertility [16]. In parallel with the aggravation of lameness, the BCS of the cow is reduced [7]. It is one reason for the decline in economic losses in milk production and the reduction of the resulting income. It also increases the cost of medical treatment, and contributes to the deterioration of milk due to the antibiotic therapy [13]. In Hungary, the largest proportion of the economic damage originates from the value of decreased milk sales (44.9%) and the early culling of cows (39.4%) [19]. Based on foreign experience, the ratio of damage is: a loss of milk production 40%, reduced reproduction 26% and costs of medical treatment 34% [3]. Due to lameness the estimated total mean reduction in milk yield per 305-d lactation was approximately 360 kg [9]. There are a number of studies about the relationship between body condition and lameness. Mostly of studies, there is a negative correlation between the two parameters [11]. However, the issue is extremely complex, in most cases we can read due to lameness the feed intake is reduced and therefore the body condition became worse. Examining the Holstein-Friesian and Simmental cows showed that both species had the most the case of low BCS in the lame cows (BCS: H-F 1,25-2,5;Simmental: 2,5-3,75). However, it was found that the two biggest risk factors for lameness are feeding problems and the poor quality of the floor [12]. The rate of condition change also affects the health. The studies have shown that the loss of body condition in the dry period is associated with a greater number of reproductive disorders and lameness [14]. The cows are more prone to lameness, where the body condition score decreased significantly after parturition [15]. There are fewer lame cows among the ones in good condition. Of all diseases, the mastitis of cows means one of the

biggest economic damage, because during the disease the quantity of milk and the fat of milk is reduced. The seriousness of mastitis is expressed by the increase of SCC. In one study, we read that milk production of sub-clinically infected cows was 2.45 kg less per day than that of the healthy cows [1]. According to a Hungarian study of all economic damages, 71% is resulted from reduced milk production and the need to discard milk from sick animals, 25% culling of incurable cows, and 4 % costs of medical treatment [18]. The risk of developing high somatic cell counts and clinical mastitis is higher if the animal has poor body condition [21].

MATERIAL AND METHODS

Our examinations were carried out on a cattle farm in south-eastern Hungary, we analyzed the 4491 data of 862 cows. Between 2008-2009 there were 10 times recorded data (body condition score, foot health status). We have examined the movement of cows, in terms of lameness, then we divided them into two groups: lame (l) and not lame (nl). At the same time we determined the body condition scores (BCS) too. We analyzed the somatic cell count (SCC). The milk samples were given during the test milking. The SCC counts were transformed by a logarithmic scale. We looked for correlation between the period of lactation (<50 days, 51-100 days, 101-150 days, 151-200 days, 201-250 days;> 250 days) and body condition status BCS <2.5; BCS = 2.5 ; 3> BCS> 3.5; BCS> 4), furthermore between the period of lactation and somatic cell count (SCC), as well as between the period of lactation and milk production. These examinations were performed both in the lame and non-lame groups. We examined the difference between the two groups in milk production and milk somatic cell count by variance analysis.

RESEARCH RESULTS

The Holstein-Friesian cows are typically high milk production types, and his intense milk production strongly exhausts the body of the cows. This means that it causes problems in the reproductive and metabolic functioning, but it is significantly affect the state of health of the udder too [5]. The quantity of milk is reduced due to mastitis and the amount of milk sold is reduced too, because people must not drink the milk of sick animals. These factors cause economic losses. More economic damage is caused by lameness and additional costs (weight loss, reproductive disorders, increase treatment costs and culling loss). The cow must be culled if it cannot be cured with treatment [13].
First we studied the changes of BCS during lactation in the lame and not-lame cows (Figure 1).

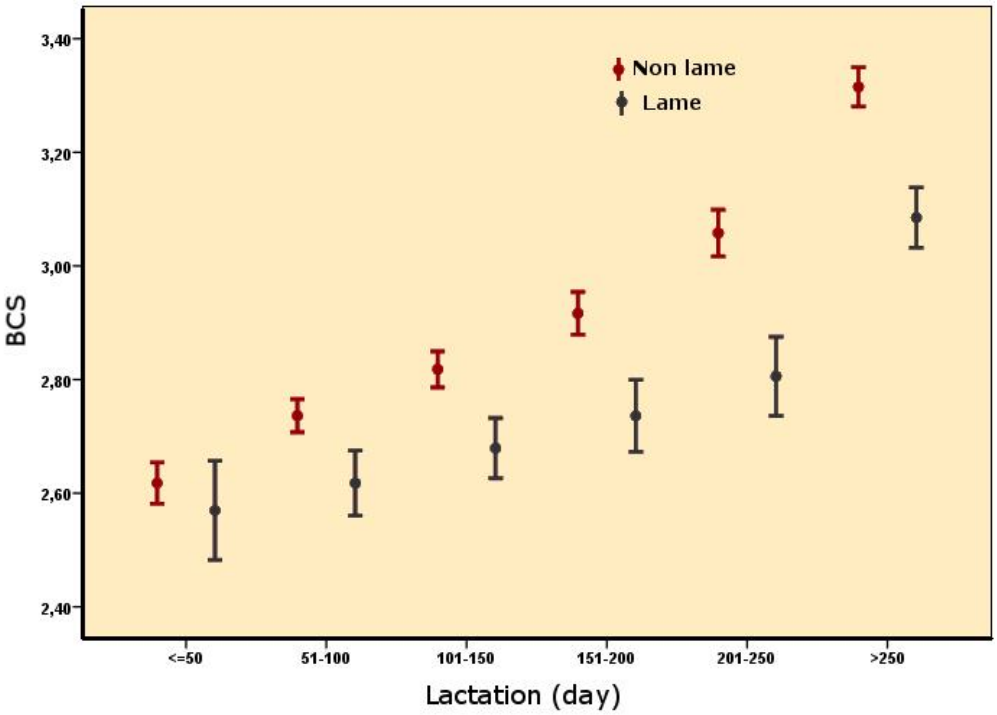

Figure1. Body Condition Scores with regard to period of lactation (lame, not lame)

In the lame cows poor body condition was more frequent, than in fatty animals. This result is supported by studies, that due to the lameness the animal's feed intake is not enough, therefore the body condition decreases [14, 8]. Together with the increase in the lactation period, BCS has also increased. This is understandable, because towards the end of lactation the milk production reduced and producing less milk is not a significant effort for the cow so the BCS can increase. At beginning of lactation the BCS is poorer, because of the high level of milk. This trend is observed in both groups, but the body condition of lame cows is always weaker during lactation. Minimum average difference (0,048 BCS) was on the fiftieth day of lactation between the two groups, this difference was only 0.23 BCS after the two hundredth day. The values of the 95% confidence intervals, we can conclude that the body condition of non-lame cows is more uniform than that of the cows in a lame group. The body condition shows a moderate positive relationship with lactation periods (r_{nl}=0,52, r_{l}=0,43), while with the milk production there is a medium negative correlation (r_{nl}=-0,40, r_{l}=-0,35).

In the early lactation the milk production is high and at the end of lactation the production gradually decreases, which is a normal tendency (Figure 2.). But in the lame group the correlation between the two variables got a little closer (r_{nl}=-0,579; r_{l}=-0,646). Until the hundredth day of lactation milk production of lame cows is more than healthy ones, the first 50 days, the difference between groups was 0.98 kg (P> 5%). The confidence limit in this period also shows a greater difference in lame cows for milk production. The difference between the two groups suggests that the high yielding cows are more exposed to the disease [20]. During the later stages of lactation the lame cows produced less milk.

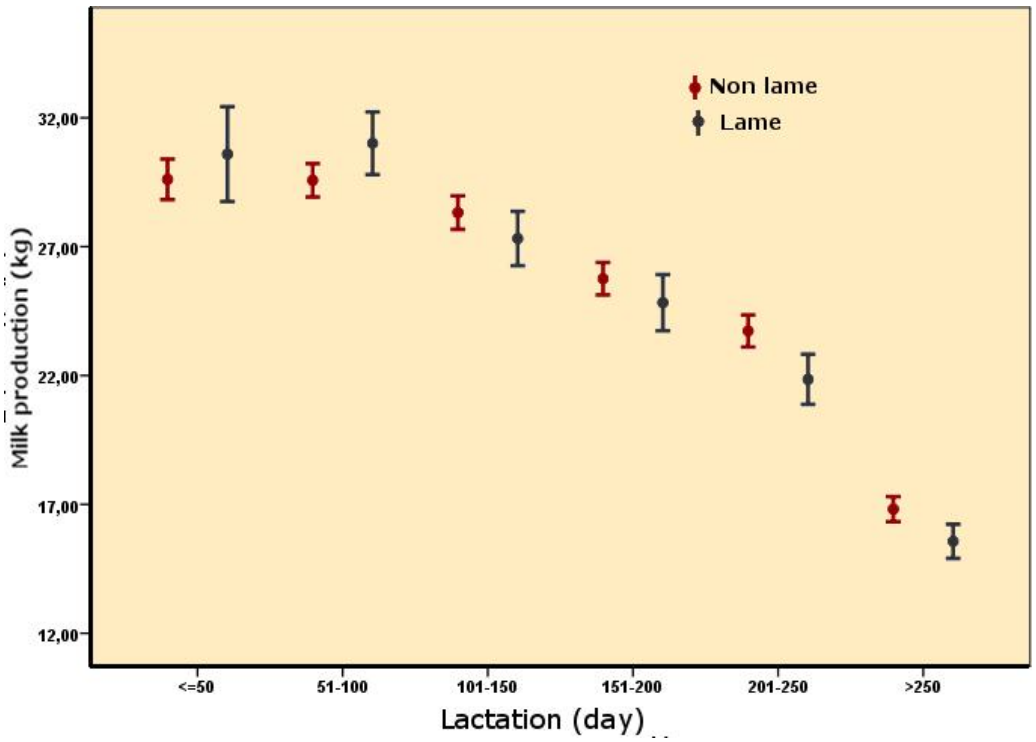

Figure 2. SCC with regard to lactation number (lame, non- lame)

On the figure 3. we can see the changes of SCC period of lactation. Clearly show that milk somatic cell count increases during lactation, independently of the foot health status.

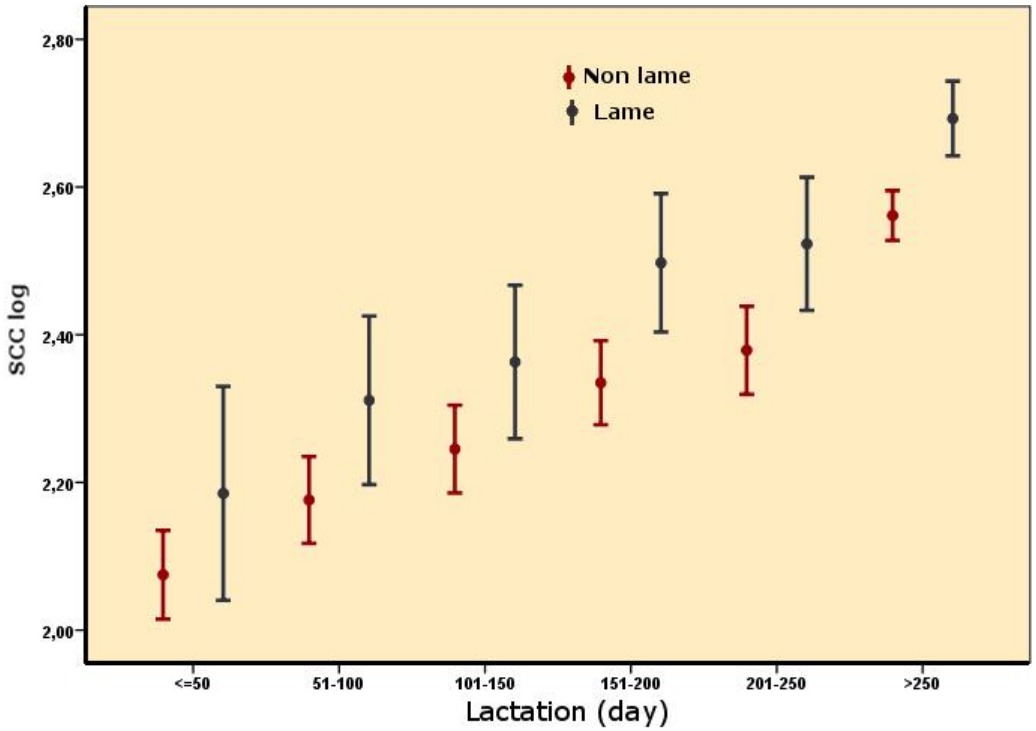

Figure 3. SCC with regard to lactation number (lame, not lame)

Logarithmic values of the somatic cell count vary between 2.07 and 2.69. The biggest difference (0.17) was found between 151-200 days in milk samples, between groups. There is a positive correlation between the somatic cell count and increase the length of time what the cows spend lying down, as the lame cows spend more time lying down [22], This can be associated with this result is that the milk of cows lame was higher

than the number of cells in all cases. There was a loose correlation between the duration of lactation and somatic cell count (r_l=0,26, r_{nl}=0,26).

CONCLUSIONS

The greatest economic damages of milk producing farms are caused by two diseases, lameness and mastitis. Analyzing the relationship between them two factors are found, that the dairy production of lame group are mostly unfavourable, independently of the period of lactation and BCS. During lactation the body condition increased in both groups, while the milk production decreased, but at the lame cows these values were lower (r_{nl}=-0,40, r_l=-0,35). The lame cows produced more milk , than the non-lame cows until the 100th day of lactation, then it was less, than in case of the non-lame cows (r_{nl}=-0,58; r_l=-0,65). Somatic cell counts increased in both groups during lactation, but the SCC was more in the milk of the lame cows. Our results show that further examinations are necessary. It is appropriate to examine the degree of lameness, and to measure the changes of the BCS and milk production per animal.

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